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Medication-induced hospitalization and clinical pharmacists role regarding, at an al-Basra teaching hospital in Iraq

Muhannad Salah Hamza Alradhi
Iraqi Ministry of health, Basrah Health Directorate, Basrah-Iraq
Corresponding author email: muhannad.alradhi@gmail.com

Yasameen Mohammed Abbas Alghadir
Iraqi Ministry of health, Basrah Health Directorate, Basrah-Iraq
Email: yassminalghadear@gmail.com

Samar Sami Alawee
Iraqi Ministry of health, Al Basrah teaching hospital, Basrah-Iraq
Email: angel27924@gmail.com

Mustafa Abdulmohsin Mustafa
Iraqi Ministry of health, Al Basrah teaching hospital, Basrah-Iraq
Email: tsummust55@gmail.com

Mohammed Falah Fenjan
Iraqi Ministry of health, Al Basrah teaching hospital, Basrah-Iraq
Email: mff8840@gmail.com

***Abstract*---**Study objective: Our objective is to determine the proportion of medication-related problems that lead to patient admission, such as drug interactions, side effects, and drug abuse. The study also aims to evaluate the significance of the clinical pharmacist's contribution to patient care and follow-up regarding the appropriate use of safe and effective treatments. Methods: This study was conducted at al Basra Teaching Hospital. All 115 patients with drug-related hospitalization (DRH) who were admitted between May 1 and June 30, 2022, were included in the study. The patients' ages ranged from 35-75 years, with a median of 52 ±3.5 years. Hospitalized patients' due to drug-related reasons are as follows: Approximately 32% of cases are antibiotics, 20% are cardio-logical cases, 7.8% are diabetic cases, 13% are monoclonal antibody therapies, 7.8% are NSAIDs, and 19% are other cases. One of three clinical pharmacists with residency training and the attending emergency physician assessed each enrolled patient for the existence or absence of an

adverse drug event resulting in hospitalization. Clinical pharmacists collected data on the patient's medication usage, medical history, previous allergies and intolerances, and the complaint they were presenting with. The Basra Teaching Hospital patient care information system and the attending emergency physician provided information on the results of the diagnostic tests. The clinical pharmacist determined whether or not the patient's admission was the result of an adverse drug event after gathering all relevant data on the subject. Results: In this study, 85 women and 30 men were enrolled, and as a result of drug-related problems, the following situations required hospitalization: the percentage of patients who received a diagnosis of an adverse drug event involving DTF is 21.73 %, followed by cases involving contraindications (22.6 %), side effects (26 %), adverse effects (19.13 %), non-compliance (4.35 %), and the same percentage of attempted suicide. Finally, 1.74% was due to a drug interaction. 32% of the studies evaluated admissions due to antibiotic-related problems, 20% of patients' due to problems with antihypertensive medications, and 47% of other factors associated with drug-related hospitalization. In addition, the clinical pharmacist made recommendations to the doctor in this study (30%). Conclusion: According to this study, there were many discovered adverse drug events that led to their admission to the hospital. and here this study emphasized the importance of involving clinical pharmacists in the health care of patients in the hospital emergency department for the purpose of discovering treatment errors and discussing them for the reducing cases of misuse of prescribed drugs.

***Keywords*---**drug related hospitalization, adverse drug events, drug therapeutic failure, clinical pharmacist, drugs, patient compliance, prescription errors.

Introduction

The use of medications is rising globally. This can be explained by the expanding pharmaceutical industry's ability to produce more varieties of drugs and the rising prevalence of ailments that have increased the demand for pharmaceuticals. Medication use can result in a variety of results, from the therapies' anticipated therapeutic effects to mild side effects and even death[1]. The concept "drug related problem" (DRP) refers to an event or condition involving a patient's medication therapy that actually inhibits or may delay the achievement of the desired result. This might be due to poor drug choice, unfavorable drug reactions, untreated indications, drug interactions, insuf ficient dosage, incorrect drug use, and noncompliance. According to reports, DRP-related admissions have increased over the years[2, 3].

According to estimates, drug-related disorders (DRPs) account for 8.7 million hospital admissions and 17 million emergency room visits annually in the United States. Analyses of studies on DRPs that lead to hospital admission indicate that DRPs account for 5–15% of all hospitalizations, of which 25–75% could have been

avoided. The majority of preventable adverse drug events (ADEs) are linked to medications with constrained therapeutic indices and those that need ongoing, frequent monitoring. Several traits have been noted as potential risk factors for hospital admissions related to drug use. Age, having a wide range of medical specialties, being a woman, and having co-morbidities are a few examples[2, 4]. Hospitalization due to drug use will have detrimental effects on patients and society as a whole. Depending on the contexts, approaches taken, and populations studied, it lowers income and household productivity, raises mortality and morbidity rates, raises health care costs, and lowers quality of life. Various studies conducted around the world revealed varying levels of incidence and preventability of drug-related hospital admissions[4, 5].

These clinical pharmacists can also help patients with recognizing, fixing, and avoiding drug-related issues by offering pharmaceutical care. The influence of clinical pharmacists on incorrect prescribing in hospitalized patients is only partially evaluated by studies that have been specifically developed. Focusing on high-risk populations such patients who use many drugs, which is a significant risk factor for incorrect prescribing, could improve the effectiveness of such as interventions[3, 6, 7]. Additionally, if strategies to enhance prescribing are implemented by a medical professional who closely collaborates with primary care doctors on clinical staff, they may be strengthened. Clinical pharmacists in settings that provide ambulatory care may be in an ideal position to collaborate with medical specialists to reduce inappropriate prescribing[8].

Materials and Method

This study was conducted at al Basra Teaching Hospital. All 115 patients with drug-related hospitalization (DRH) who were admitted between May 1 and June 30, 2022, were included in the study. The patients' ages ranged from (35-75) years, with a median of 52 ±3.5 years. Hospitalized patients due to drug-related reasons are as follows: approximately 32% of cases are antibiotics, 20% are cardio-logical cases, 7.8% are diabetic cases, 13% are monoclonal antibody therapies, 7.8% are NSAIDs, and 19% are other cases[9].

Patients were not included in the study if any of the following conditions were met: (1) they left the emergency room before speaking with an emergency doctor or a clinical pharmacist; (2) they were transferred from another hospital for specialized care; or (3) the emergency physician interview and questionnaire were not completed. One of three clinical pharmacists with residency training and the attending emergency physician assessed each enrolled patient for the existence or absence of an adverse drug event resulting in hospitalization. Clinical pharmacists collected data on the patient's medication usage, medical history, previous allergies and intolerances, and the complaint they were presenting with. The Basra Teaching Hospital patient care information system and the attending emergency physician provided information on the results of the diagnostic tests. The clinical pharmacist determined whether or not the patient's admission was the result of an adverse drug event after gathering all relevant data on the subject[10].

The adverse drug events considered were either dose-related therapeutic failure (DTF), which means a lack of therapeutic effect caused by drug noncompliance, a too-low dose prescribed, interaction, recent dose reduction/discontinuation, or insufficient monitoring[11]. In the basic intervention group, a clinical pharmacist started an organized, patient medication review as soon as the patient was admitted, when laboratory data became available, and when the primary medical admission report was finished. The effectiveness of each medication on the medication list was assessed based on its indication for use, dosage (taking renal failure, age, and other factors into consideration), adverse drug events, therapeutic duplication, dosage time and interval, formulation and strength, interactions, contraindications, precautions, and unique patient characteristics[3].

Following the medication review, our participating pharmacists were not allowed to change the patient's medications. however, they did record possible alterations. A clinical pharmacist filled out the patient's data (clinical pharmacist intervention sheet) and, if possible, spoke with the patient's doctor, who would then accept or reject the advice[12]. Within the first two days of admission, and rarely after, the patients were contacted by a clinical pharmacist trainee. A thorough drug history was taken, with particular focus on the previous 14 days. When necessary, additional information was gathered from family members, home nurses, doctors, or other sources[9]. Among the topics covered in the interview were dose adjustments, new medications, drug discontinuation, drug administration, adverse drug events, adherence, and cost. Motivational interviewing is a coaching technique that aims to ensure adequate patient behavior in order to reduce adverse drug reactions and other drug-related concerns. All interventions were carried out by clinical pharmacists who had been trained. Three distinct pharmacists were involved in data collection during the study, though not at the same time due to employment changes and other factors. Furthermore, all pharmacists were educated in medication review workshops and had completed a 2-day training in motivational interviewing with the following practice sessions prior to participating in the study[3]. On the basis of written and verbal information, every patient contacted agreed to participate. The regional ethics committee also approved the study[13].

Data extraction

Study area, study design, subjects, sample size, main findings (frequency of hospital admission and death due to drug-related problems, type, severity, casualty and preventability of DRPs, drugs and drug classes responsible for admission, and factors associated with drug-related admission) and study characteristics (study area, study design, subjects, and sample size) were all taken from Al Basra teaching hospital by clinical pharmacist trainees.

Statistical analysis

The data was statistically analyzed using percentages, frequencies, and mean standard deviation as required. P values lower than 0.05 were considered statistically significant. The 19.0 version of the Predictive Analytics software was used.

Result

Regarding the 115 patients who were admitted, shown in Figure 1 as 85 women and 30 men, as a result of drug-related problems, the following situations required hospitalization. Figure 3 shows that the percentage of patients who received a diagnosis of an adverse drug event involving DTF is 21.73%, followed by cases involving contraindications (22.6%), side effects (26%), adverse effects (19.13%), non-compliance (4.35%), as well as the same percentage of attempted suicide, and finally 1.74% related to drug interaction. As shown in Table 1, and Figure 2, which depicts the baseline characteristics of the patients included in the study, 32% of the studies assessed admissions due to problems related to antibiotics, 20% of patients related to problems with antihypertensive medications, and a reminder, 47% of other factors that are associated with drug-related hospitalization.

Clinical pharmacists at the hospital offered interventions to doctors regarding drug-drug interactions, dosing, ADR, DTF, and drug abuse Some of these interventions, such as aspirin and mefenamic acid, were prescribed to nine patients (7.8%), causing GIT bleeding. Other examples from other groups include vancomycin as a cause of red man syndrome (13%) and lisinopril with aspirin as a drug drug interaction (17.4%) of the study sample. Therapy failure due to patient misuse, such as glimepiride (33.3%)[3].

Additionally, in this study, the clinical pharmacist made recommendations to the doctor (30%), for example, advising adding propranolol to the treatment plan for a patient who was experiencing arrhythmia as a side effect of taking methylprednisolone, increase the dose of methyldopa after low dose therapeutic failure in first trimester pregnant lady.

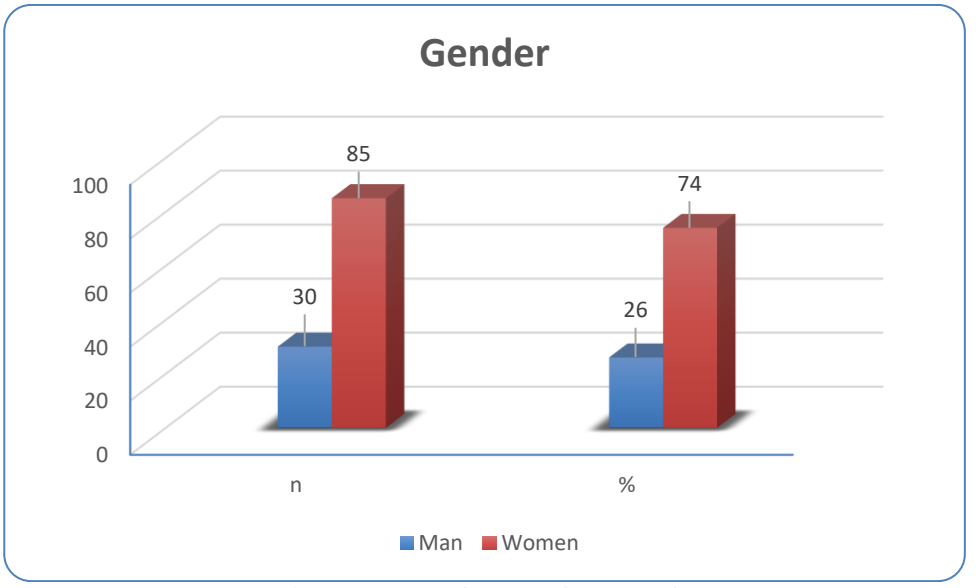

Figure 1: Gender graph (n=115).

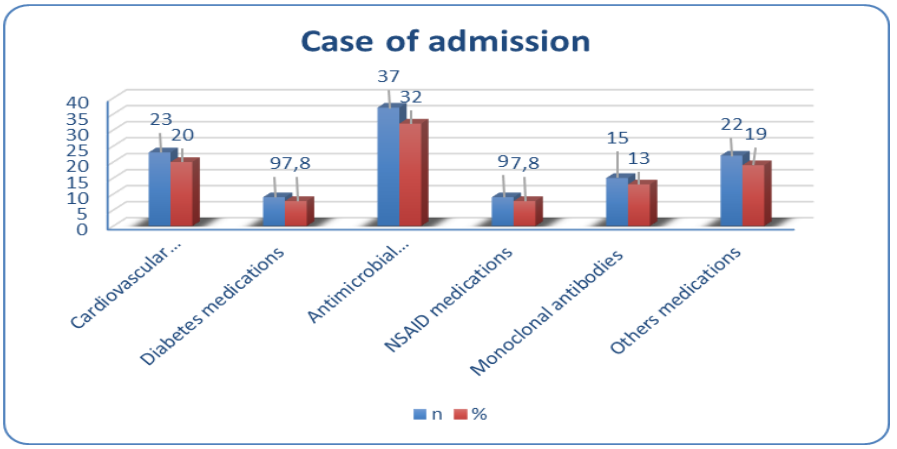

Figure 2: Characteristics of drug-related hospitalizations (n=115)

Table 1: Characteristics of patients admitted to hospitals for drug-related reasons and the intervention of clinical pharmacists (n=115)

Drug	n	DRH (symptom)	Mechanism	Clinical Pharmacist Intervention
Venofere	1	Allergic reaction, hypotension and nausea	Adverse drug reaction	Add hydrocortisone, slow infusion
Olan	2	Tardive dyskinesia	Contraindication	Stop Olan
Citalopram	1	Serotonin syndrome	Contraindication	Stop citalopram
Diazepam	4	suicidal attempt	suicide attempt	Given antidote
Ferrous sulphate	1	GIT discomfort, dyspepdia	Side effect	Change to ferrous gluconate
Prednisolone	1	steroid induced oral candidiasis	side effect	use nystatin oral drop
levetiracetam	1	sleepiness and decrease consciousness	Side effect	Dose reduction
Metoclopramide	3	contraindicated with colostomy	Contraindication	use ondansetron amp.
Biotin	1	False TSH result and misdiagnosis due to prolonged use	Drug therapeutic failure	stop biotin
Methylprednisolone	3	arrhythmia	Adverse drug reaction	add propranolol
Tramadol	2	acute dystonic reaction	Contraindication	stop tramadol, add nefopam on need
Iron	1	misuse in thalacemic patient	Drug therapeutic failure	stop iron, use deferoxamine inj.
Clonazepam	1	suicidal attempt	suicide attempt	Given antidote

Metformin	2	failure of therapy due to patient incompliance	Drug therapeutic failure	change to insulin therapy
Glimepiride	3	failure of therapy due to patient misuse	Drug therapeutic failure	change to insulin therapy
Pioglitazone	2	failure of therapy due to patient misuse	Drug therapeutic failure	change to insulin therapy
Insulin	2	failure of therapy due to misuse	Drug therapeutic failure	Adjust insulin dose
Rosuvastatin	1	Rhabdomyolysis	Contraindication	Stop statin, change to fenofibrate
Lasix	2	Gentamycin Lasix contraindication	contraindication	change to ceftriaxone
Methyldopa	1	therapeutic failure	Drug therapeutic failure	increase dose
Lisinopril	4	contraindicated with aspirin	contraindication	use ARABS type antihypertensive
Spironolactone	3	arrhythmia	adverse drug reaction	add propranolol
Anticoagulants	1	therapeutic failure	Drug therapeutic failure	add clexane
Heparin	2	thrombocytopenia	adverse drug reaction	change to clexane
Plavix	1	nose bleeding	Side effect	Dose reduction
Dopamine	1	contraindicated with uncorrected ventricular fibrillation	contraindication	use noradrenaline
Propranolol	2	bronchospasm	drug interaction	stop propranolol
Salbutamol	1	tachycardia	Side effect	dose reduction
Enoxaparin	3	bruise	side effect	change the site of injection
Digoxin	1	contraindicated with omeprazole	contraindication	stop omeprazole
Rituximab	3	Hypotension	adverse drug reaction	Add hydrocortisone to the therapy
Immunoglobulin	4	rash, dyspnea	Side effect	slow infusion time
Cyclophsphamide	2	Rash, dyspnea, hyperthermia	Side effect	Add mesna, increase fluid intake, slow infusion rate
Tysabri	2	JCV positive	contraindication	Stop Tysabri, use steroids
Fingolamod	5	incompatibility	non-compliance	change to tysabri
Aspirin	4	GIT bleeding	Side effect	Stop aspirin, add omeprazole 5 vials for 3 days.

Ibuprofen	1	Sickle cell crisis	contraindication	Stop Ibuprofen
Diclofenac	2	contraindicated in asthmatic patients	contraindication	use paracetamol
Mefenamic acid	1	GIT lesion	Drug therapeutic failure	use misoprostol
Indomethacin	1	peptic ulcer	Side effect	use misoprostol
lyophilized Amphotericin B	2	nose bleeding, rash, tachycardia, dyspnea, electrolyte imbalance	Side effect	change amphotericin B to posacanazole tab.
Vancomycin	5	Red man syndrome	Drug therapeutic failure	slow the infusion time
Augmentin	2	diarrhea, nausea, vomiting	Side effect	Add enetrogermina
Ciprofloxacin	3	Thalacemic crisis	contraindication	Stop ciprofloxacin
Levofloxacin	3	Anaphylactic reaction	adverse drug reaction	Add hydrocortisone, allermine, zantac amp.
First line anti TB	1	Failure	Drug therapeutic failure	change to second line
Clofazamine	1	Brownish skin pigmentation	adverse drug reaction	Monitoring
All antibiotics used	1	Vaginal thrush	adverse drug reaction	add clotrimazole cream
Meropenem	1	Under therapeutic dose	Drug therapeutic failure	increase dose
Amoxicillin	1	penicillin allergy	Side effect	add hydrocortisone, allermine, change to gentamycin
Ceftriaxone	5	Vaginal thrush	adverse drug reaction	add clotrimazole cream
Amikacin	3	contraindicated in Myasthenia Gravis	contraindication	Use ceftriaxone
Metronidazole	2	nausea and vomiting, bitter taste	Side effect	dose reduction
Azithromycin tab	1	therapeutic failure due to misuse	Drug therapeutic failure	change to ceftriaxone vial
lyophilized Amphotericin B	3	nose bleeding, rash, tachycardia, dyspnea, electrolyte imbalance	Side effect	change amphotericin B to liposomal type.
Fluconazole	3	misuse to treat	Drug	stop fluconazole

		mucormycosis	therapeutic failure	

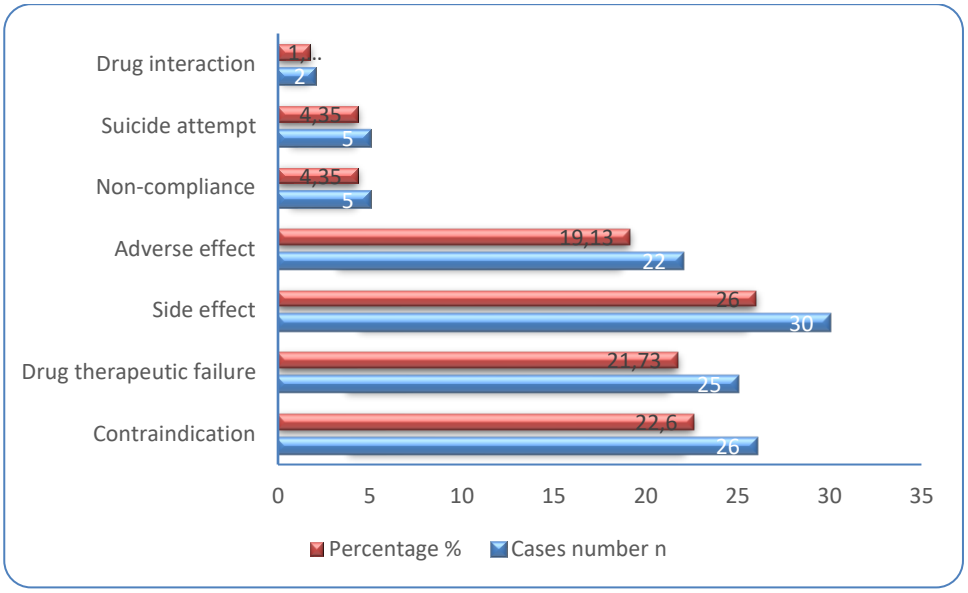

Figure 3: Characteristics of patient cases (n=115).

Discussion

To the best of our knowledge, this is one of the few studies that demonstrate how a clinical pharmacist providing pharmaceutical care can help improve and maintain prescribing appropriateness in polypharmacy patients[3]. The current study reveals a high frequency of admissions related to drugs. The estimate contains some inherent flaws because some of the "possible" drug-related issues actually exist. As a result, the value of 15.65% for DTF is likely lower than the true rate of DRH, which is 84.34% due to ADR. As a result, about one-third of patients were admitted due to a symptom for which they were already receiving treatment; as a result, they might have experienced the negative effects of non-compliance. With very few exceptions, we have relied on a personal interview to determine our estimate of patient compliance[11].

There is considerable disagreement about the scope of the DRH problem, and published studies report widely disparate percentages. The findings indicate that variation in the intensity and quality of DRH monitoring is a significant source of variation. The data was gathered entirely on the basis of a general request that doctors and pharmacists report cases of DRH. A random sample of non-DRH cases revealed that this 'passive self-reporting' system missed at least one-third of cases that were later determined to be DRH[1, 11]. Finally, a doctor's perception of the term "drug-related" may differ significantly from that of the investigator; for example, a case of insulin-induced hypoglycemia was reportedly not drug-related, but rather "due to insufficient carbohydrate intake." Thus, it appears clear that a valid estimate of the DRH rate can only be obtained if data is collected by

someone who is qualified to evaluate each case independently, such as clinical pharmacists.

The general criteria for determining the causality of events presented a unique and challenging problem for NSAID-or aspirin-induced ulcers. A reasonable temporal relationship between the start of drug therapy and the onset of ADR symptoms is generally required for a probable ADR. In some cases, the patient had been taking an NSAID for so long that the cumulative risk of developing a spontaneous ulcer could not be ignored. We chose to disregard the long duration of therapy and make whether the patient had spontaneous ulcers the main factor in distinguishing between probable and possible drug-induced ulcers[13].

In addition, the current multifaceted intervention included patient education, pharmacist-led medication matchmaking, and collaborative care between the pharmacist and the patient's primary care physician. This was done to improve adherence to medication. Our findings also support previous studies on polypharmacy in ambulatory patients and the role of the clinical pharmacist in their healthcare delivery, demonstrating there aren't many significant drug interactions and therapeutic overlaps[14, 15].

Conclusion

According to this study, there were many discovered adverse drug events that led to their admission to the hospital. In some of these cases, the patient is the main cause due to non-compliance in using the prescribed drugs correctly or the use of some medicines inappropriately. There are other reasons, including errors made by doctors when writing some medications, which can result in therapeutic interactions or adverse drug reactions; or errors in calculating doses and routes of administration; and here this study emphasized the importance of involving clinical pharmacists in the health care of patients in the hospital emergency department for the purpose of discovering treatment errors and discussing them for the reducing cases of misuse of prescribed drugs. According to the findings of this study, clinical pharmacists play an important role in identifying drug inconsistencies and communicating this information in order to reduce their impact.

Limitation

Finally, because our research was limited to a single hospital with trained clinical pharmacists, only similar settings can apply to our findings. We were also unable to look further into factors related to doctors' and medication-related issues because of the small sample size of the patients studied.

Acknowledgments

The authors would like to thank the hospital staff, doctors, and pharmacists who assisted with data collection and outcome assessments for this study, as well as the patients and families who participated.

Ethical approval

The ethics committee at the University of Basra/Medical College and the clinical pharmacy section in the Basra health department approved the study design. The committee was enthusiastic about the project.

Conflicts of interest: The authors declare that they have no conflicts of interest.

References

1. Al-Arifi, M., et al., *Emergency department visits and admissions due to drug related problems at Riyadh military hospital (RMH), Saudi Arabia.* Saudi Pharmaceutical Journal, 2014. 22(1): p. 17-25.
2. Carter, B.L. and D.K. Helling, *Ambulatory care pharmacy services: the incomplete agenda.* Annals of Pharmacotherapy, 1992. 26(5): p. 701-708.
3. Dewi, P. S., Ratini, N. N., & Trisnawati, N. L. P. (2022). Effect of x-ray tube voltage variation to value of contrast to noise ratio (CNR) on computed tomography (CT) Scan at RSUD Bali Mandara. *International Journal of Physical Sciences and Engineering*, *6*(2), 82–90. https://doi.org/10.53730/ijpse.v6n2.9656
4. Graabæk, T., et al., *Pharmacist-led medication review in an acute admissions unit: a systematic procedure description.* European Journal of Hospital Pharmacy, 2015. 22(4): p. 202-206.
5. Hallas, J., et al., *Drug related admissions to a cardiology department; frequency and avoidability.* Journal of internal medicine, 1990. 228(4): p. 379-384.
6. Hallas, J., et al., *Drug related hospital admissions: the role of definitions and intensity of data collection, and the possibility of prevention.* Journal of internal medicine, 1990. 228(2): p. 83-90.
7. Hallas, J., et al., *Drug-related admissions to a department of medical gastroenterology: the role of self-medicated and prescribed drugs.* Scandinavian journal of gastroenterology, 1991. 26(2): p. 174-180.
8. Ho, P.M., et al., *Multifaceted intervention to improve medication adherence and secondary prevention measures after acute coronary syndrome hospital discharge: a randomized clinical trial.* JAMA internal medicine, 2014. 174(2): p. 186-193.
9. Hohl, C.M., et al., *Do emergency physicians attribute drug-related emergency department visits to medication-related problems?* Annals of emergency medicine, 2010. 55(6): p. 493-502. e4.
10. Jatau, A.I., et al., *Prevalence of drug-related emergency department visits at a teaching hospital in Malaysia.* Drugs-real world outcomes, 2015. 2(4): p. 387-395.
11. Majumdar, S.R., H.L. Lipton, and S.B. Soumerai, *Evaluating and improving physician prescribing.* Pharmacoepidemiology, 2005. 4: p. 419-438.
12. Montamat, S.C. and B. Cusack, *Overcoming problems with polypharmacy and drug misuse in the elderly.* Clinics in geriatric medicine, 1992. 8(1): p. 143-158.
13. Pemayun, C. I. B., & Martini, I. A. O. (2021). Implementation motivation, work discipline in work productivity of employees in the

hospital. *International Research Journal of Management, IT and Social Sciences*, *8*(6), 630-638. https://doi.org/10.21744/irjmis.v8n6.1961

14. Repp, K.L., et al., *Drug-related problems and hospital admissions in cardiac transplant recipients.* Annals of Pharmacotherapy, 2012. 46(10): p. 1299-1307.
15. Schnipper, J.L., et al., *Role of pharmacist counseling in preventing adverse drug events after hospitalization.* Archives of internal medicine, 2006. 166(5): p. 565-571.
16. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Get vaccinated when it is your turn and follow the local guidelines. *International Journal of Health Sciences*, *5*(3), x-xv. https://doi.org/10.53730/ijhs.v5n3.2938
17. Thevelin, S., et al., *Development of a standardized chart review method to identify drug-related hospital admissions in older people.* British journal of clinical pharmacology, 2018. 84(11): p. 2600-2614.
18. Thikra Etihad, M.M.A., *Randomized clinical trial (RCT) of a clinical pharmacist intervention to reduce drug misuse and improve inappropriate prescribing in hospitalized patients in province of Al Basra.* International Journal of Health Sciences / https://doi.org/10.53730/ijhs.v6nS2.8388, 2022. 6(SSN 2550-6978 E-ISSN 2550-696X): p. 12845–12852.